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Hence

$$z = \frac{-(3b-a^2) \pm \sqrt{\{(3b-a^2)^2 - 4(3ac-b^2)(3b-a^2)\}},}{2(3b-a^2)}$$

but in the equation

$$x''^3 + Ax''^2 + \tfrac{1}{3}A^2x'' + c' = 0, \quad x'' = -\tfrac{1}{3}A + \tfrac{1}{3}(A^3 - 27c')^{\frac{1}{3}},$$

by completing the cube, and transposing c. Therefore, also,

$$x'^{-1} \text{ or } \frac{1}{x'}$$

$$= -\tfrac{1}{3}\,\frac{3z^2+2az+b}{z^3+az^2+bz+c} + \tfrac{1}{3}\left\{\left(\frac{3z^2+2az+b}{z^3+az^2+bz+c}\right)^3 - \frac{27}{z^3+az+bz+c}\right\}^{\frac{1}{3}}$$

$$\therefore x'$$

$$= 3\left\{-\frac{3z^2+2az+b}{z^3+az^2+bz+c} + \sqrt[3]{\left(\frac{3z^2+2az+b}{z^3+az^2+bz+c}\right)^3 - \frac{27}{z^3+az^2+bz+c}}\right\}^{-1};$$

but $x' + z = x$, by the hypothesis in the original equation:

$$\therefore x = z$$

$$+3\left\{\frac{(3z^2+2az+b)}{z^3+az^2+bz+c} + 3\left(\frac{3z^2+2az+b}{z^3+az^2+bz+c}\right)^3 - \frac{27}{z^3+az^2+bz+c}\right\}^{-1};$$

consequently, substitute the foregoing value of z into this last formula, and it gives the value of the unknown quantity in any cubic of the form that I proposed."

Rev. Professor Haughton made a communication "On the Depth of the Sea deducible from Tidal Observations," of which the following is an abstract.

He stated that, in consequence of his having succeeded in separating the effects of the sun and moon in the diurnal tide, he was enabled to make calculations of the depth of the sea in which the tidal wave was produced, which he believed to be worthy of the greatest attention. The depth of the sea may be inferred from three distinct observations, viz., of heights of diurnal tide; of solitidal and lunitidal intervals; and of the age of the lunar tide compared with the lunitidal interval.

The calculations founded on the last two methods gave respectively 11·9 miles and 11·3 miles, each result being a mean of those derived from eight stations, agreeing remarkably well with each other.

The calculation founded on heights gave as a result a depth of 5·12 miles, agreeing with a result deduced by Laplace from the long series of Brest observations on the semidiurnal tide, viz., 5·07 miles.

Mr. Haughton was of opinion that the first result, viz., 11·6 miles, is the depth of the central channel of the South Atlantic, up which the tide waves advance from the Antarctic Ocean; while the second result, viz., 5 miles, deduced from heights, represents the mean depth of the whole Atlantic Ocean, including the shallow water of the soundings in the eastern portion, near the British Islands. This view he considered to be confirmed by the great age of the diurnal tide, viz., five to six days,—a circumstance which shows the great distance from the coast at which the tide wave is formed, which gives the character to the diurnal tides of the Irish coasts.